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ENDANGERED SPECIES

Technical Bulletin

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Help Is On the Way for Rare Fishes of the Upper Colorado River Basin

Sharon Rose and John Hamill
Denver Regional Office

On January 21-22, 1988, the Governors of Colorado, Wyoming, and Utah joined Secretary of the Interior Hodel and the Administrator of the Western Area Power Administration in signing a cooperative agreement to implement a recovery program for rare and endangered species of fish in the Upper Colorado River Basin. The recovery program is a milestone effort that coordinates Federal, State, and private actions to conserve the fish in a manner compatible with States' water rights allocation systems and the various interstate compacts that guide water allocation, development, and management in the Upper Colorado River Basin.

The Colorado River is over 1,400 miles long, passes through two countries, and has a drainage basin of 242,000 square miles in the United States, yet it provides less water per square mile in its basin than any other major river system in the United States. Demands on this limited resource are high. The Colorado River serves 15 million people by supplying water for irrigation, hydroelectric power generation, industrial and municipal purposes, recreation, and fish and wildlife enhancement.

The headwater streams of the Upper Colorado River originate in the Rocky and Uinta Mountains. Downstream, the mainstem river historically was characterized by silty, turbulent flows with large variations in annual discharge. The native warmwater fishes adapted to this demanding environment; however, to meet man's ever increasing demands for water, impoundments were constructed that radically changed the ecological characteristics of the river.

Some native warmwater species endemic to the Colorado River Basin, including the Colorado squawfish (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*), were unable to adjust to the modifications of their environment. Changes in streamflow and water temperature, direct loss of

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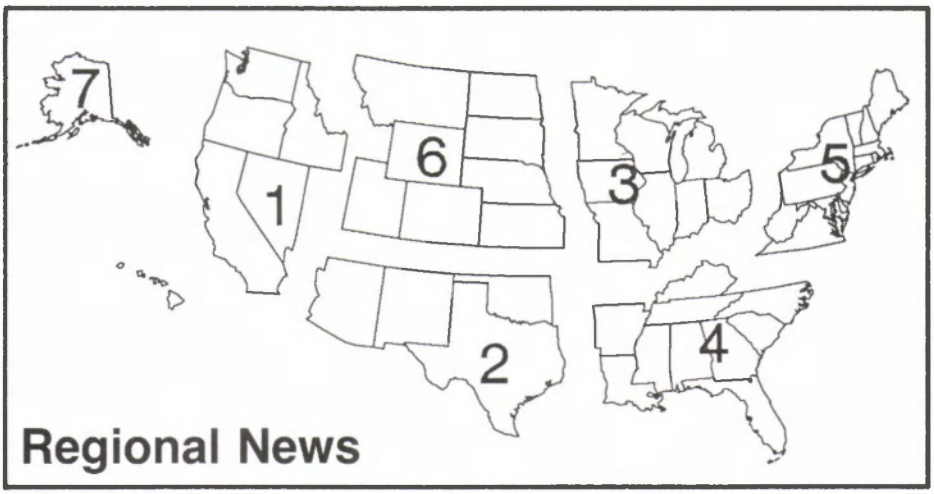
photo by Tom Lytle

Upper Cross Mountain Canyon on the Yampa River historically was habitat for the Colorado squawfish, humpback chub, razorback sucker, and bonytail chub. The first three can still be found in this stretch, but the bonytail's presence is unknown because the species' numbers are so low. This section of the Yampa River may be a suitable site for restocking of these rare native fishes.



Regional News

Endangered species regional staff members have reported the following news:

Region 3—With the use of a Federal grant authorized under Section 6 of the Endangered Species Act, the State of Iowa has purchased a 13-acre site near St. Olaf that contains habitat for the largest known population of the northern wild monkshood (*Aconitum noveboracense*). The site, with over 10,000 monkshoods, will be fenced this summer.

Region 4—A Conservation Agreement has been established between the Fish and Wildlife Service and The Nature Conservancy to protect one of the two remaining populations of the Endangered Alabama leather flower (*Clematis socialis*). This population is located on The Conservancy's Virgin's Bower Preserve in St. Clair County, Alabama. Under the terms of the agreement, the Service will assume management responsibility for the site.

* * *

In the past, up to 50,000 Indiana bats (*Myotis sodalis*) hibernated at Long's Cave in Mammoth Cave National Park, Kentucky. At present, however, only 2,500 to 7,000 bats remain. One reason for this serious decline is the presence of a poorly designed gate, located at the entrance, that restricts air flow and bat movement into the cave. The National Park Service plans to replace the gate with a new angle-iron bat gate in FY 1988 or FY 1989. Biologists from the Service's Asheville, North Carolina, Field Office have been gathering baseline data on temperature and humidity levels in the cave. The information, which is being collected before and after gate replacement, will help the Service to better predict the results of future modifications to the entrances of bat hibernation caves.

* * *

Region 6—The Peregrine Partnership, which includes the Colorado Division of Wildlife, Colorado Wildlife Federation, and Denver Museum of Natural History, is planning to place up to six American peregrine falcon (*Falco peregrinus anatum*) chicks in a hack box on the 23rd floor of a building in downtown Denver. The highnse habitat is similar to that in other cities where peregrines have been successfully hacked. The city's large populations of pigeons and starlings will be prey for the urban falcons. Similar programs have been successful in Milwaukee, Wisconsin; Salt Lake City, Utah; Albany, New York; and Baltimore, Maryland.

* * *

The final recovery plan for the Wright fishhook cactus (*Sclerocactus wrightiae*) has been printed and distributed. The plan calls for the establishment of two self-sustaining populations of 10,000 individuals each before the species will be considered for downlisting to Threatened status. A third such population must be established before the species can be delisted. The Wright fishhook cactus, listed in 1979 as Endangered, is currently known from a limited number of small populations in Emery and Wayne Counties, Utah.

The final recovery plan for the spineless hedgehog cactus (*Echinocereus triglochidiatus* var. *inermis*) has been printed. This En-

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U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2**: Arizona, New Mexico, Oklahoma, and Texas. **Region 3**: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4**: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the U.S. Virgin Islands. **Region 5**: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6**: Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7**: Alaska. **Region 8**: Research and Development nationwide.

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Loss of Wetlands Threatens Four Plants

Four species of plants in the eastern United States were identified during February as vulnerable to extinction because of a decline in their freshwater wetland habitat. In order to make them eligible for protection under the Endangered Species Act, Endangered or Threatened listings were proposed for the following:

Mountain Sweet Pitcher Plant (*Sarracenia rubra* ssp. *jonesii*)

Carnivorous plants, or plants that trap and consume insects, have long fascinated many people. Although the Venus flytrap (*Dionaea muscipula*) is the best known example, carnivorous plants take a number of other forms. Pitcher plants, for example, produce clusters of erect, trumpet-shaped leaves that form roughly tubular "pitchers" covered by a chordate hood. Insects are attracted to nectar secreted by glands near the pitcher orifice or to the plant's showy coloration, and some crawl or fall into the pitchers. Just inside the mouth of the pitcher tube is a very smooth surface, which offers no footholds to most insects, and below that the interior is lined with stiff downward-pointing hairs that further hamper escape. Those insects that cannot get away are eventually digested by enzymes in the fluid secreted inside the pitchers.

The mountain sweet pitcher plant is a subspecies endemic to a few mountain bogs and streamsides in southwestern North Carolina and northwestern South Carolina along the Blue Ridge Divide. Of the 26 populations known historically, only 10 remain. The others were eliminated by drainage of boggy habitats; flooding by impoundments; conversion of the sites to agricultural and grazing land; collection; and various forms of development. Eight of the ten surviving populations are on private property where they may face threats from habitat alteration and collectors of carnivorous plants. Two occur on State of South Carolina lands, but even these populations are vulnerable to illegal take and, in one case, impacts from recreation.

In light of these threats, the Service has proposed to list *Sarracenia rubra* ssp. *jonesii* as Endangered (F.R. 2/10/88). Comments on the proposal should be sent to the Asheville Field Office, U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina 28801, by April 11, 1988.

Photo by Julie Moore

South Carolina Natural Heritage Program photo

The mountain sweet pitcher plant is an herbaceous perennial that grows up to 29 inches (73 centimeters) in height. Its pitchers are a waxy green, usually lined with maroon-purple veins. The uniquely showy and fragrant flowers have recurving sepals, are borne singly on erect scapes, and are usually maroon in color.

Decurrent False Aster (*Boltonia decurrens*)

Endemic to the wet floodplains of the Illinois and Mississippi Rivers, the decurrent false aster is known only from the States of Illinois and Missouri. This impressive perennial herb in the family Asteraceae grows up to 79 inches (2 meters) in height. It produces clusters of attractive aster-like flowers with yellow disks and white to (more commonly) purple rays. The flower heads, which are about the size of a quarter-dollar, are borne in small clusters on branched inflorescenses.

Destruction or modification of native floodplain habitat has significantly reduced the distribution of *B. decurrens* from historical levels. Extensive surveys by State botanists from 1980 to 1985 located a total of 12 surviving populations in Illinois. There are another two populations known in Missouri. Drainage of marshes and wet prairies for agricultural development has been a problem for the species, but the main continuing threat is thought to be siltation. As a result of extensive row crop agriculture within the watershed and the alterations of natural water flow cycles by numerous levee systems, heavy loads of silt—up to 3 inches (76 millimeters) in a year—are deposited in the floodplains, preventing seed germination. Because of these threats, the Service has proposed to list the decurrent false aster as Threatened (F.R. 2/25/88).

Four of the populations known to remain occur on public lands, three of them on Illinois State property and one on land administered by the U.S. Army Corps of Engineers in St. Charles County, Missouri. Management plans are being developed for the *B. decurrens* populations in Illinois, and the Corps of Engineers may soon enter into a cooperative management agreement with the Missouri Department of Conservation. Because of the habitat siltation, certain agricultural practices and other means of soil manipulation may be helpful to conserve current populations and to establish new ones. It has been observed that the species does grow in some disturbed alluvial deposits.

Comments on the proposal to list *B. decurrens* as a Threatened species should be sent to the Regional Director, Region 3 (address on page 2 of the BULLETIN), by April 25, 1988.

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Wetland Plants

(continued from page 3)

Harperella (*Ptilimnium nodosum*)

Named after Dr. Roland M. Harper, who discovered this plant in 1902, the harperella is an annual in the parsley family (Apiaceae). This species grows up to 39 inches (one meter) in height and produces small white flowers in heads not unlike those of the Queen Anne's lace (*Daucus carota*). It occurs in Alabama, Georgia, the Carolinas, West Virginia, and Maryland.

Another wetland-dependent plant, the harperella is always found on saturated substrates and it readily tolerates periodic, moderate flooding. It occurs in two specific habitat types: 1) the shoals and margins of clear, swift-flowing streams, and 2) the edges of shallow, intermittently flooded ponds and wet meadows on the coastal plain. The species' tolerance of flooding may be of key importance because few potential competitors are adapted to such water fluctuations. However, the amount and frequency of flooding is critical; prolonged or extensive floods can wash away the seed bank, while insufficient flooding can lessen the species' competitive edge over other plants.

More than one-half of the historically known harperella populations have disappeared. Extensive surveys by The Nature Conservancy and State Natural Heritage Programs have documented only 10 remaining populations. Because *P. nodosum* has such specific ecological requirements, it can easily be extirpated from an area even by seemingly minor alteration of the habitat. Wetland drainage, water quality degradation, siltation, and various forms of development threaten the harperella's habitat. In West Virginia, approximately 10,000 plants were destroyed by the construction of a vacation home development in 1984.

P. nodosum is not known to occur on any Federal lands. Some populations are found on State lands, along streams over which States have jurisdiction, or on preserves owned by The Nature Conservancy. State Natural Heritage Programs, particularly in South Carolina and West Virginia, have been actively pursuing easements and voluntary protection agreements with landowners. Such agreements, while potentially very useful in protecting the plants, have no legal authority; accordingly, the Service has proposed to list the harperella as Endangered (F.R. 2/25/88).

Comments on the listing proposal should be sent to the Ecological Services Field Office, U.S. Fish and Wildlife Service, 1825 Virginia Street, Annapolis, Maryland 21401, by April 25, 1988.

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photo by John Schwegman

Among the distinguishing characteristics of* Boltonia decurrens *are its decurrent (downwardly curved) leaves and attractive, aster-like flowers.

photo by Judy Jacobs

The harperella's small white flowers may appear from May to frost.

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Swamp Pink (*Helonias bullata*)

Another plant threatened by the loss of wetland habitat is the swamp pink, a perennial in the lily family (Liliaceae). This plant, characterized by attractive pink to purplish flowers, represents the only species in its genus. Historically, it occurred in swamps, bogs, spring seepages, meadows, and streams edges from New York to Georgia.

The widespread drainage and development of eastern wetlands eliminated the swamp pink from many former habitats. For example, the species has been extirpated from New York, and the number of reported sites in New Jersey has declined from approximately 100 historically to 35-40 today. Other colonies remain in Virginia (eight sites), North Carolina (seven sites), Delaware (six sites), and Maryland, Georgia, and South Carolina (one site each). Most of these populations are on private lands where they are vulnerable to further losses of wetland habitat.

Collecting, though not as great a danger to the swamp pink as habitat loss, is a significant threat. This species is referred to in a number of wildflower books and field guides as one of the most beautiful plants in the eastern United States, a description that attracts many garden hobbyists and curiosity seekers. Plants have frequently been taken from the wild, often without the consent of the landowners. Commercial trafficking in wild *H. bullata* does not appear to be serious at this time; a few nurseries do sell swamp pinks cultivated from seed.

A few swamp pink populations occur on Federal or State lands, where they receive some protection from collecting and habitat degradation. However, these sites are not enough to ensure the species' long term survival. On February 25, the Service proposed to list *H. bullata* as a Threatened species.

Comments on the listing proposal should be sent to the Regional Director, Region 5, by April 25, 1988.

* * *

Conservation Measures Authorized by the Endangered Species Act

Among the conservation benefits provided to a species if its listing under the Endangered Species Act is approved are: protection from adverse effects of Federal activities; restrictions on take and trafficking; the requirement for the Service to develop and implement recovery plans; the authorization to seek land purchases or exchanges for important habitat; and the possibility of Federal aid to State or Commonwealth conservation departments that have signed Endangered Species Cooperative Agreements with the Service. Listing also lends greater recognition to a species' precarious status, which encourages further conservation efforts by State and local agencies, independent organizations, and individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the survival of a listed species. If an agency finds that one of its activities may affect a listed species, it is required to consult with the Service on ways to avoid jeopardy. For species that are proposed for listing and for which jeopardy is found, Federal agencies are required to "confer" with the Service, although the results of such a conference are non-binding.

Further protection is authorized by Section 9 of the Act, which makes it illegal to take, possess, transport, or traffic in listed animals except by permit for certain conservation purposes. (See *Code of Federal Regulations*, Title 50, Part 17.) For plants, the prohibition against collecting applies only to listed taxa found on lands under Federal jurisdiction. Some States, however, have their own more restrictive laws against the take of listed plants.

photo by D.B. Snyder, New Jersey Natural Heritage Program

The swamp pink, a very distinctive plant, is named for its wetland habitat and the strikingly attractive pink to purplish flowers. The flower clusters are borne at the end of a hollow stem up to 2 feet (60 centimeters) in height that grows from a basal rosette of lance-shaped, evergreen leaves.

Protection Approved for Six Species

A freshwater mussel and five plants were listed during February as Threatened or Endangered species. The protection authorized by the Endangered Species Act is now available to the following:

- **Louisiana Pearlshell (*Margaritifera hembeli*)**—This freshwater mussel or clam is endemic to a single drainage, the Bayou Boeuf, in Louisiana. Reservoir construction, pollution, and siltation from land disturbances in the watershed have degraded the pearlshell's aquatic habitat and reduced its range to only a few headwater streams. Most of the remaining habitat is within Kisatchie National Forest, and the Fish and Wildlife Service will work with the U.S. Forest Service to design logging operations that will produce less harmful runoff. The final rule listing the Louisiana pearlshell as Endangered was published in the February 5, 1988, *Federal Register*.

- **Aleutian Shield-fern (*Polystichum aleuticum*)**—One of the rarest ferns in North America, *P. aleuticum* apparently is restricted to two mountain sites in the Aleutian Islands of Alaska. Only one population, consisting of six individual plants, is known to survive. The Service will work with the U.S. Navy, which holds development rights to the island (Adak) on which the population was discovered, to conserve the plant's naturally harsh alpine habitat. Surveys will be conducted at potential sites in an effort to locate other populations. The Aleutian shield-fern is now listed as Endangered (F.R. 2/17/88).

- **Baricao (*Trichiia triacantha*)**—This evergreen shrub or small tree is native to low elevation semideciduous forests in southwestern Puerto Rico. A total of 18 individuals remains at 5 sites, all within Guanica Commonwealth Forest. Its range may have been considerably broader before the widespread deforestation of Puerto Rico in past years. The remaining populations are in ravines where they are vulnerable to damage or destruction by flash-floods. Any illegal cutting of these trees, which have wood of desirable qualities, would also threaten the species with extinction. For these reasons, the Service has listed *T. triacantha* as an Endangered species (F.R. 2/5/88).

- **Black-spored Quillwort (*Isoetes melanospora*), Mat-forming Quillwort (*I. tegetiformans*),** and **Little Amphianthus (*Amphianthus pusillus*)**—All three of these small aquatic plants are endemic to pools on the surface of granite outcrops in Georgia, Alabama, and South Carolina. Many of these outcrops are subject to quarrying, heavy recreational use, dumping, and other activities dangerous to the plants. Both *Isoetes* taxa have been listed as Endangered (F.R. 2/5/88). *A. pusillus* occurs over a somewhat wider range than the other two species; therefore, it was listed as Threatened.

Colorado River Fishes

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habitat due to inundation by reservoirs, blockage of migration routes, and interactions with introduced, non-native fish species (predation and competition) are primarily responsible for the decline of these native fish species. Due to their low numbers and inadequate recruitment, three of the fishes—the Colorado squawfish, humpback chub, and bonytail chub—have been federally listed as Endangered. A fourth, the razorback sucker, is a candidate for Federal listing.

Since 1978, the Service has issued over 100 Biological Opinions (pursuant to Section 7 of the Endangered Species Act) on water development projects in the Upper Colorado River Basin, all of which concluded that the cumulative effects of water depletions from the Upper Colorado River system were likely to jeopardize the survival of the endangered Colorado River fishes. In 1984, the Service also produced a draft conservation plan that specified minimum flows for the listed fishes throughout the Upper Basin. Several States and water development organizations responded that the Service's position on water depletions and minimum streamflows was in direct conflict with State water rights systems, Interstate Compacts, and related Supreme Court decrees. The result was that a major controversy threatened to develop and embroil the various State, Federal, and private interests in a confrontation over endangered species protection and water resource development. These parties recognized that such a confrontation was unlikely to result in progress toward the recovery of the listed fishes and could lend a measure of uncertainty to water development in the Upper Basin. As a result, in August 1984 the Service formed the Upper Colorado River Basin Coordinating Committee to provide a forum for discussion and negotiation. Members of the Coordinating Committee included the Service, Bureau of Reclamation, and States of Colorado, Utah, and Wyoming. In addition, private water development interests actively participated in the process.

The Coordinating Committee's formal charge was a narrow one. Recognizing that earlier inter-agency consultations under Section 7 of the Endangered Species Act had found that new water projects would be likely to jeopardize the listed fish species, this committee was to identify reasonable and prudent alternatives that would conserve the species while permitting new water development to proceed. However, during their discussions the parties concluded that both the biological requirements of the four species and the hydrology and management of the Upper Colorado River Basin were exceedingly complex. As a consequence, they agreed that a comprehensive program for implementing a broad range of conservation measures was needed.

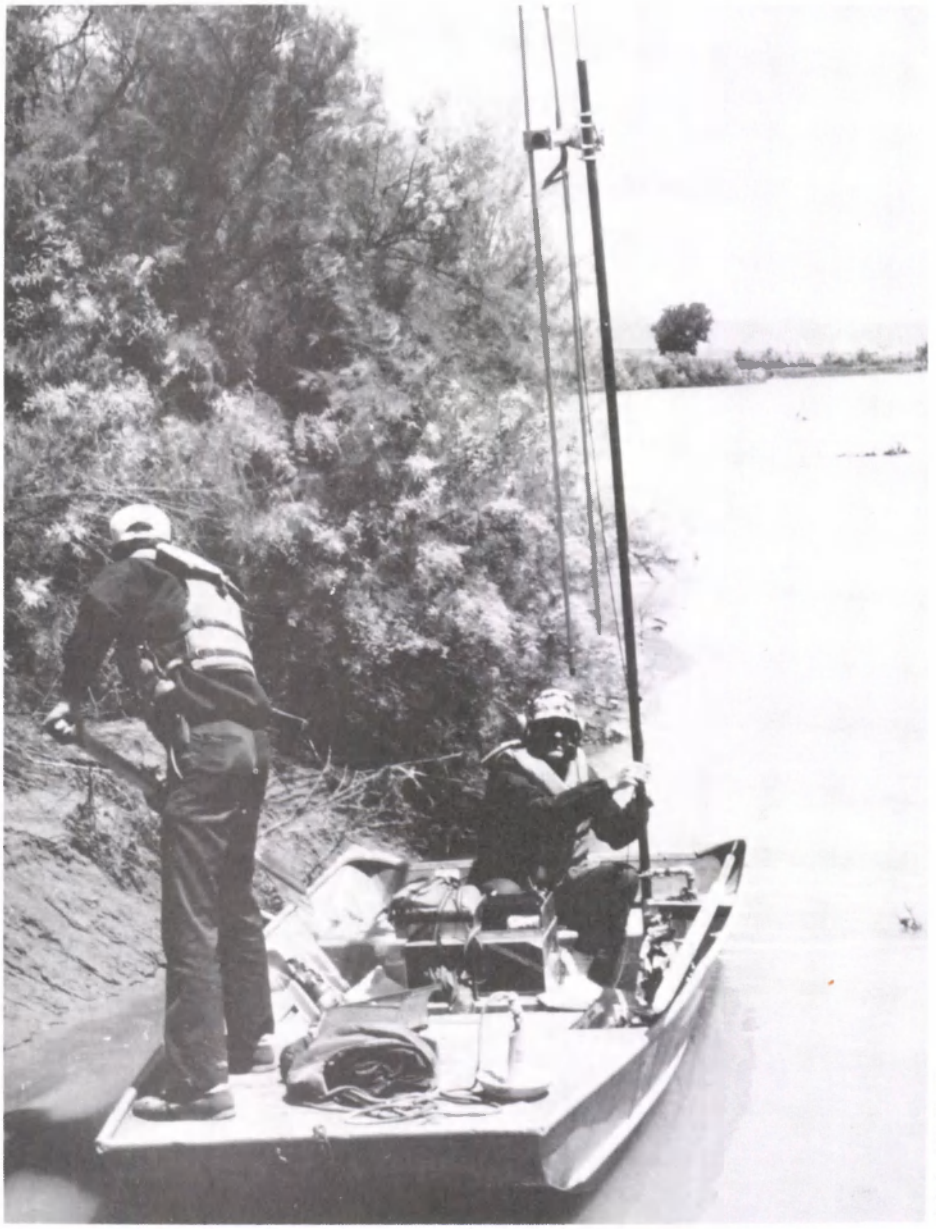

photo by John Hamill

tracking radio-tagged Colorado squawfish

After nearly 4 years of intense discussions, data analysis, and negotiations, the Coordinating Committee produced "The Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin." The Recovery Program agreement, which was signed in January 1988, also created a 10-member Recovery Implementation Committee that will oversee the program's implementation by the Service. The Recovery Program established five basic recovery elements:

1. **Provision of instream flows.** Instream flow needs for the four rare fishes will be identified for all the major rivers in the Upper Basin. The Recovery Program anticipates that the needs of the fish in major portions of the Colorado and Green Rivers can be provided through refinement and protection of releases from Federal reservoirs, such as Flaming Gorge and Blue Mesa. In addition, in unregulated systems like the Yampa and White Rivers, the program calls for water rights to be acquired, converted into instream flows, and administered pursuant to State water law. The program further recommends funding of $10 million for water rights acquisition. In Fiscal Year 1988, $1 million were appropriated by Congress to initiate the acquisition of water for instream flows.

2. **Habitat development and maintenance.** Fish habitat will be developed or maintained through potential habitat management techniques, such as the creation of backwaters for nursery and feeding habitat and the construction of jetties to provide over-wintering habitat.

3. **Native fish stocking.** A hatchery rearing and stocking program will be evaluated as a means to augment the endangered fish populations, although the Recovery Program recognizes that this

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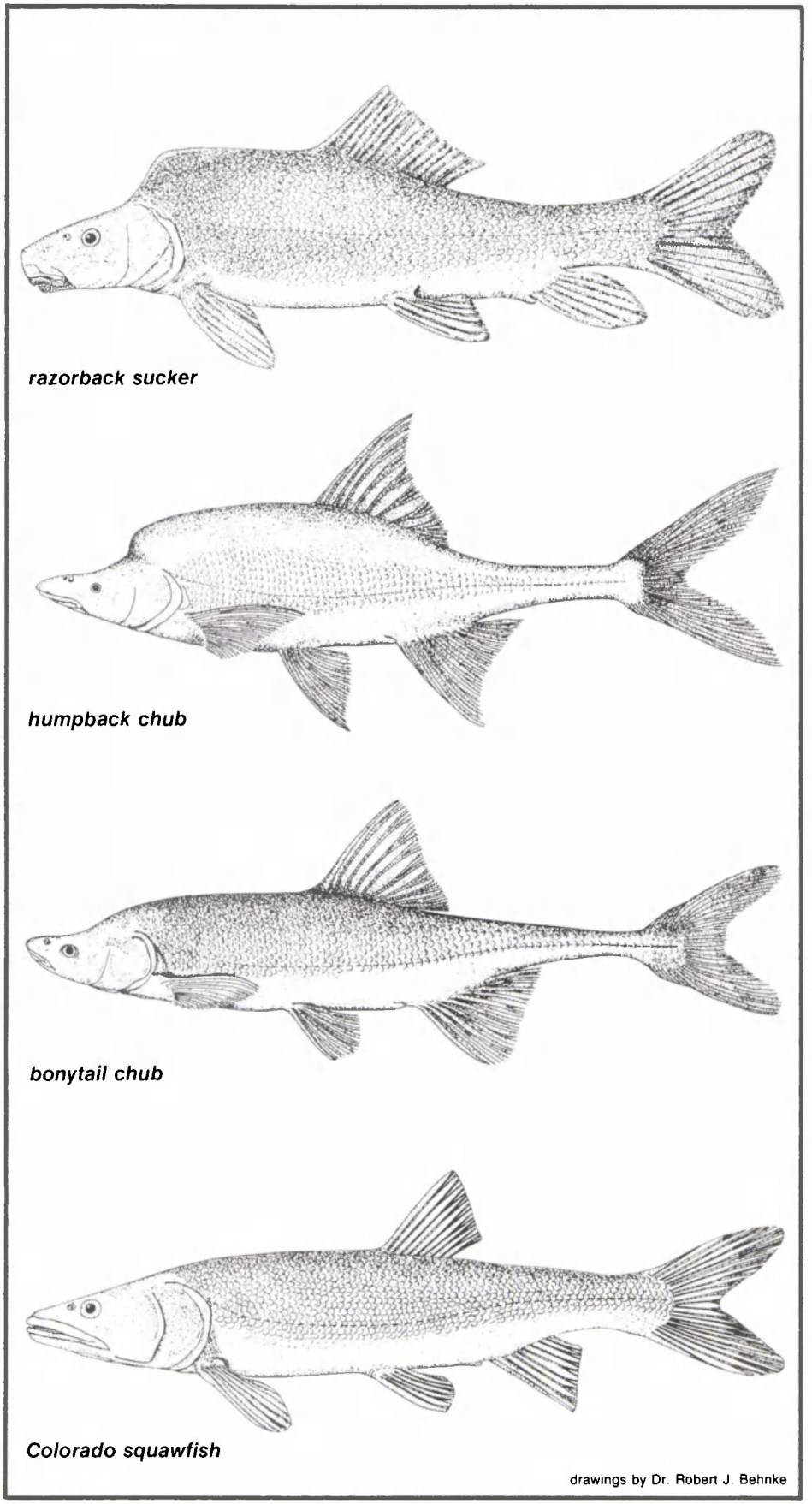
will not be a complete solution to the problem. Manmade areas, such as gravel pits along the Colorado River, can be used as rearing areas for native fishes.

4. Management of non-native species and sportfishing. Certain introduced fish species are suspected to prey on, or compete with, the endangered fishes. In addition, anglers have been known to capture endangered fishes frequently in some areas. These potential problem areas will be monitored and controlled where necessary and feasible through a cooperative effort between State wildlife agencies and the Service.

5. Research, monitoring, and data management. Detailed study plans will identify criteria needed for recovery, test the effectiveness of management and recovery strategies, and evaluate the life history and habitat of each of the four species. Monitoring will track population status and trends and evaluate the overall success of the program. Timely analysis and reporting of monitoring and research data will be accomplished by a cost-effective data management system. This centralized system will serve as an information resource for directing management strategies and recovery activities.

The program's recovery goals for the Colorado squawfish and humpback chub are to maintain and protect self-sustaining populations and sufficient natural habitat to support these populations. Due to the particularly critical status of the bonytail chub, the immediate goal is to prevent its extinction, while the ultimate goal is to protect self-sustaining populations and natural habitat. Although the razorback sucker is not currently listed as Endangered or Threatened, its precarious status makes it desirable to provide for its future using the same goals established for the Colorado squawfish and humpback chub.

Funding of the Recovery Program is a cooperative responsibility. Expenditures are divided into two areas, the annual operating budget and capital funds. The projected annual budget for the recovery program is $2,300,000. Sources for both funds will include Federal and State governments, power and water users, and private donations. (The Fish and Wildlife Service is currently contributing approximately $600,000 per year toward this annual cost.) Two capital funds are needed through congressional appropriations. One of the funds (approximately $10 million) will be for the purchase of water rights to establish instream flows. In addition to the flow acquisition fund, $5 million will be needed to initiate other recovery construction elements, such as hatcheries, additional fish passages, habitat modification, and other projects. Contributions by proponents of non-Federal water projects will provide an additional source of funding, offsetting depletion impacts by contributing $10 per acre-foot (adjusted annually for inflation) based on the average annual depletion of the project.



razorback sucker

humpback chub

bonytail chub

Colorado squawfish

drawings by Dr. Robert J. Behnke

This Recovery Agreement represents a major effort to satisfy a group of highly divergent interests. If successful, it will demonstrate that, with cooperation and careful planning, development and the needs of native fishes in the Upper Colorado River Basin can be compatible.

Regional News

(continued from page 2)

dangered cactus occurs within a 75-mile area in Colorado and Utah. Threats to the species include collecting and potential habitat disturbance. The plan calls for protection of existing populations and research on the plant's taxonomic status, as well as an inventory of potential habitat.

Both plans are available for purchase by writing to the Fish and Wildlife Reference Service, 6011 Executive Boulevard, Rockville, Maryland 20852; or call toll-free at 800/582-3421. (In Maryland, call 301/776-3000.)

* * *

Region 8 (Research)—The Patuxent Wildlife Research Center reports that nine volunteer nest watchers began working on the Puerto Rican parrot (*Amazona vittata*) research project in mid-February to watch, guard, and collect data during daylight hours on the active Puerto Rican parrot nests in the wild. The volunteer nest watcher program is a cooperative venture between the Service, the National Audubon Society, and the Student Conservation Association. This is the second year that the nest watcher program has been conducted. Volunteers will remain on the project until early June.

* * *

A radio telemetry study on the 'oma'o or Hawaiian thrush (*Myadestes obscurus*), a surrogate test species for the Endangered palila (*Loxioides bailleui*), is proceeding on schedule at Patuxent's Hawaii Research Station. Transmitter attachment techniques have been refined, receiving systems tested under operational conditions, and personnel trained in tracking methodology. Since December 28, four Hawaii thrush have been captured in mist nets in the Hawaii Volcanoes National Park, fitted with radio transmitters, and tracked daily.

* * *

The National Fisheries Research Center-Seattle has recently completed a 3-year study on the life history and habitat requirements of the Moapa dace (*Moapa coriacea*) so that suitable habitat can be provided at Moapa National Wildlife Refuge in southern Nevada, the first refuge ever created for a fish. Research in support of the goal of species recovery has been completed, and results and recommendations have been passed on to Region 1, which has management responsibility.

BOX SCORE OF U.S. LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S. Only	ENDANGERED U.S. & Foreign	ENDANGERED Foreign Only	THREATENED U.S. Only	THREATENED U.S. & Foreign	THREATENED Foreign Only	SPECIES* TOTAL	SPECIES WITH PLANS
Mammals	28	19	240	3	3	23	316	23
Birds	61	15	145	7	3	0	231	55
Reptiles	8	7	59	14	4	14	106	21
Amphibians	5	0	8	4	0	0	17	6
Fishes	41	2	11	25	6	0	85	45
Snails	3	0	1	5	0	0	9	7
Clams	29	0	2	0	0	0	31	21
Crustaceans	5	0	0	1	0	0	6	1
Insects	8	0	0	7	0	0	15	12
Plants	139	6	1	31	3	2	183	56
TOTAL	327	49	467	97	19	39	998	263 **

Total U.S. Endangered 376
Total U.S. Threatened 116
Total U.S. Listed 492

Recovery Plans approved: 223
Species currently proposed for listing: 17 animals
31 plants

*Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are: the leopard, gray wolf, bald eagle, piping plover, roseate tern, Nile crocodile, green sea turtle, and olive Ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

**More than one species are covered by some recovery plans, and a few species have separate plans covering different parts of their ranges.

Number of Cooperative Agreements signed with States and Territories: 51 fish & wildlife
March 31, 1988 36 plants

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